

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 3

PROGRAM ELEMENT: 0603640M

PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R2223 Marine Corps Advanced Technology	18,996	11,430	12,499	16,131	15,621	16,838	17,155	CONT.	CONT.
C2297 Marine Corps Warfighting Laboratory(MCWL)	27,410	47,537	32,727	32,760	33,407	34,465	35,173	CONT.	CONT.
R2362 Extended Littoral Battlespace (ELB) Advanced Concept Technology Demonstration (ACTD)	9,898	9,598	9,523	946	943	0	0	0	45,503
TOTAL	56,304	68,565	54,749	49,837	49,971	51,303	52,328	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: As the land warfare component of Naval Expeditionary Forces, the Marine Corps has unique and technologically stressing requirements resulting from its amphibious mission, Marine Air-Ground Task Force (MAGTF) organizational structure, reliance on maneuver, logistic sustainability, and intensive tempo of operations in diverse environments. Critical Marine Corps requirements being addressed in this program element (PE) are: Maneuver, Firepower, Command and Control, Logistics, and Training and Education. These are ongoing efforts to develop and demonstrate advanced technologies and system concepts in a quasi-operational environment. Multiple transitions into the Demonstration/Validation phase are planned, as well as fieldable prototyping to reduce risk in Engineering and Manufacturing Development. Joint service efforts are in line with Defense Technology Objectives and Joint Warfighting Objectives (JWOs). In addition, Marine Corps Warfighting Experimentation in conceptual operational assessment of emerging technologies is funded. This PE also provides Extended Littoral Battlespace efforts in the area of: command, control, communications, computers and intelligence, and fires and targeting. Efforts focus on connectivity between MAGTF and Fleet organizations and naval sea-based fire support. Specifically, this PE supports the following capabilities: promptly engaging regional forces in decisive combat on a global basis; responding to all other contingencies and missions in the full spectrum of combat operations (high, mid and low intensity) in Military Operations in Urban Terrain, and in operations other than war, and warfighting experimentation. By providing the technologies to enable these capabilities, this PE primarily supports the

R-1 Line Item 21

Budget Item Justification
(Exhibit R-2, page 1 of 20)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 3

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goals and objectives of the Strike, Littoral Warfare and Surveillance Joint Mission Areas. This PE supports all of the Marine Corps mission areas.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is budgeted within the Advanced Technology Demonstration Budget Activity because it encompasses design, development, simulation, or experimental testing of prototype hardware to validate technological feasibility and utility, and reduce technological risk prior to initiation of a new acquisition program or transition to an ongoing acquisition program.

B. (U) PROGRAM CHANGE SUMMARY:

	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>
(U) FY 2000 President's Budget	56,187	56,943	59,410
(U) Appropriated Value:		67,943	
(V) Adjustments from PRESBUDG:			
(U) SBIR/STTR Transfer	-1,240	0	0
(U) Execution Adjustments	+592	0	0
(U) Comparability Adjustments	+1,023	+1,002	0
(U) Program Adjustments	0	0	-4,103
(U) Inflation Rate Adjustments	-258	0	0
(U) Various Rate Adjustments	0	0	-558
(U) Congressional Rescissions	0	-380	0
(U) Congressional Plus ups	0	+11,000	0
(U) FY 2001 President's Submission	56,304	68,565	54,749

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

R-1 Line Item 21

Budget Item Justification
(Exhibit R-2, page 2 of 20)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

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BUDGET ACTIVITY: 3

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R2223 Marine Corps Advanced Technology	18,996	11,430	12,499	16,131	15,621	16,838	17,155	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: As the land warfare component of Naval Expeditionary Forces power projection, the Marine Corps has unique and technologically stressing requirements resulting from its amphibious mission; Marine Air-Ground Task Force (MAGTF) organizational structure; and reliance on maneuver, logistic sustainability, and intensive tempo of operations in diverse environments. Critical Marine Corps requirements/imperatives being addressed in this program element (PE) are: Maneuver, Firepower, Command and Control, Logistics, and Training and Education. These are ongoing efforts to develop and demonstrate advanced technologies and system concepts in a quasi-operational environment. Multiple transitions into the Demonstration/Validation phase are planned, as well as fieldable prototyping to reduce risk in Engineering and Manufacturing Development. Joint service efforts are in line with Defense Technology Objectives and Joint Warfighting Objectives (JWOs). Efforts focus on connectivity between MAGTF and Fleet organizations and naval sea-based fire support. Specifically, this PE supports the following capabilities: promptly engaging regional forces in decisive combat on a global basis; responding to all other contingencies and missions in the full spectrum of combat operations (high, mid and low intensity) in Military Operations in Urban Terrain (MOUT), and in operations other than war; and warfighting experimentation. By providing the technologies to enable these capabilities, this PE primarily supports the goals and objectives of the Strike, Littoral Warfare and Surveillance Joint Mission Areas. This PE supports all of the Marine Corps mission areas.

R-1 Line Item 21

Budget Item Justification
(Exhibit R-2, page 3 of 20)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 3

PROGRAM ELEMENT: 0603640M

PROJECT NUMBER: C2223

PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology
Demonstrations

PROJECT TITLE: Marine Corps
Advanced Technology

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1.(U) FY 1999 ACCOMPLISHMENTS:

- (U) Maneuver Imperative: Continuation of the Joint Defense Advanced Research Projects Agency (DARPA)/United States Marine Corps (USMC) Reconnaissance, Surveillance and Targeting - Vehicle (RST/V). Fabricated and tested RST/V platform and began integration of survivability and sensor systems. Down-selected to single contractor for fabrication, testing and test support for Reconnaissance, Surveillance and Targeting Vehicle. Conducted successful Critical Design Review with contractor. Purchased all critical components and began fabrication of two demonstrator platforms to be delivered 1Q FY 2001. Completed system configuration and began fabrication of technology demonstrator for the Light Armored Vehicle SLEP. Platform will be key enabler for SLEP program and will transition to Program Manager in FY 2000.
- (U) Firepower Imperative: Continued design and fabrication of Object Individual Combat Weapon prototype. Analyzed and evaluated Contingent Low Altitude Weapons System (CLAWS), formerly HUMRAAM. Began development and evaluation of Enhanced Target Acquisition and Location System (ETALS).
- (U) Command and Control Imperative: Continued development and demonstrated technologies to make decisions, communicate information, and expand knowledge in a high tempo, uncertain, and chaotic battlefield. These technologies included large screen display technologies that are scalable for Battalion through Division and their appropriate Command Post environment. They also included horizontal integration of software capabilities/modules such that the commander and his staff see a consolidated picture of the battlespace rather than segregated applications. Continued to develop unique waveform technologies that provide low probability of detection/intercept.
- (U) Logistics Imperative: Developed and demonstrated the Combat Service Support Operations Center as a feeder to the Small Unit Logistics Advanced Concept Technology Demonstration (SUL ACTD). Configuration and testing focused on web-enabled technologies and data repositories for tactical logistics command and control. Completed fabrication and testing of Logistic Vehicle System-Replacement (LVS-R) Advanced Technology Demonstrator in support of Program Manager's acquisition strategy for LVS-R. Configuration and testing provided required data and reduced risk and cost while supporting future Milestone Decisions

R-1 Line Item 21

Budget Item Justification
(Exhibit R-2, page 4 of 20)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 3

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PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology
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PROJECT TITLE: Marine Corps
Advanced Technology

- (U) Training and Education Imperative: Continued development and demonstrated technologies to enhance the cognitive and higher-order abilities of Marine Warfighters. Efforts included: Development of the Small Unit Tactical Trainer (SUTT). Continued to support transitions to acquisition.
- (U) Project Albert funds the development of data, concepts and tools of 21st Century Operations Analysis especially in the areas of non-linear and asymmetric warfare. The goal is to generate data to support warfighting hypotheses with emphasis on questions relating to urban warfare.
- (U) Explored a K-Band Shoot Through Obscuration Technology and Training Scoring System under Congressional plus up program.
- (U) Developed the capability to fire the Shoulder Launched Multipurpose Assault Weapon from an enclosed space under Congressional plus up program.

2. (U) FY 2000 PLAN

- (U) Maneuver Imperative: Develop and demonstrate technologies that enhance operational mobility and survivability of expeditionary platforms. Continue the Joint DARPA/USMC Reconnaissance, Surveillance and Targeting-Vehicle (RST/V) program.
- (U) Firepower Imperative: Investigate technologies to increase accuracy, range, lethality, integration and timeliness of direct, indirect and close fires Begin development of the Objective Crew Served Weapon in conjunction with the Joint Service Small Arms Program. Continue development of the Complementary Low Altitude Weapons System.
- (U) Command and Control Imperative: Develop high precision target acquisition and location system that will be assembled from existing and future USMC fielded equipment. Key feature is an azimuth sensor with less than .5 degrees pointing accuracy. Develop Low Probability of Detection/Low Probability of Intercept (LPD/LPI) technology applicable to tactical hand-held dismounted communications tasks.
- (U) Logistics Imperative: Technology demonstration of new concepts in expeditionary bulk liquids distribution systems, focused on Naval seamless operation from ship to objective. Focuses on advanced concept technology demonstration for small unit logistics command and control Advanced Concept Technology Demonstration (ACTD), emphasizing decision support and improved logistics situational awareness at the tactical level. Future systems enabling logistics functions to be conducted in an OMFTS environment will be developed, tested, and

R-1 Line Item 21

Budget Item Justification
(Exhibit R-2, page 5 of 20)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 3

PROGRAM ELEMENT: 0603640M

PROJECT NUMBER: C2223

PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology
Demonstrations

PROJECT TITLE: Marine Corps
Advanced Technology

demonstrated. These future systems will be from a result of the demonstration of the Tactical Logistics Distribution System (TLoaDS), which was used by MCCDC S&A in Mission Area Analysis studies.

- (U) Training and Education Imperative: Continue to develop and demonstrate technologies to enhance the cognitive and higher-order abilities of Marine Warfighters. Efforts include: Development of the SUTT.

3. (U) FY 2001 PLAN

- (U) Maneuver Imperative: Continue to develop and demonstrate technologies that enhance operational mobility and survivability of platforms for Marine units. Conduct government testing of Reconnaissance, Surveillance and Targeting Vehicles to be delivered 1Q FY 2001. Testing will include participation in USMC Capable Warrior Advanced Warfighting Experiments and Extended Littoral Battlespace ACTD, encompassing Mobility, Survivability, Sensor, and Communications performance testing. Technology will be transitioned to the Light Strike Vehicle.
- (U) Firepower Imperative: Investigate technologies to increase accuracy, range, lethality, integration and timeliness of direct, indirect and close fires. Transition CLAWS to PM. Continue development and evaluation of Objective Crew Served Weapon System.
- (U) Command and Control Imperative: Continue development of Enhanced Target Acquisition Location (ETAL) effort. Continue development of LPD/LPI technology and demonstrate unique waveform communications devices and package technology for transfer to Director C4I.
- (U) Logistics Imperative: Continue to develop and demonstrate technologies to enhance MAGTF capabilities in operational and tactical logistics in the areas of information systems, bulk liquids, and command service support platforms. The goal is to enable sea based logistics, a tailored presence ashore, and a reduction in consumables. Continued emphasis on tactical logistics information management in the naval sea based environment. Efforts include completion of the LCS Marine DARPA initiative for voice recognition and continued SUL ACTD development of a Client/Server and web-enabled system to provide near-real-time situational awareness/visibility for logistics assets. Continued demonstration of a concept of operations and coordinated the field demonstration of both Onboard Vehicle/Refueler Communication (OVRC) and Fuel Automated Quantity Sensor (FAQS) during one of the designated assessment exercises held in FY 00. A Naval focus for fuel information aggregation will be emphasized, providing the commander critical fuel awareness across a distributed battlefield. Additionally, this task will provide variable rate flow pumps to enable Marines to fuel different types of vehicles at their optimum rate(i.e. M1A1 takes on fuel at a much higher rate than a

R-1 Line Item 21

Budget Item Justification
(Exhibit R-2, page 6 of 20)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 3

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PROJECT NUMBER: C2223

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Advanced Technology

HMMWV). The above mentioned sensors will tie into the Small Unit Logistics ACTD to provide that situational awareness by allowing a commander to query the status of fuel stores throughout the battlespace and allow for automatic requisition and distribution course of action. Budget also covers a spectrum of areas in maintenance, transportation/distribution, packaging (embarkation), and engineering (power/construction). Distribution concepts include touchpoint technologies and air/surface/ground tactical platforms as well as packaging/embarkation. Engineering areas include trafficability assessments, expedient gap crossing for small mobile units, and utilities. Maintenance concepts include predictive sensors tied to the information architecture as well as the tools to support maintenance functions in an OMFTS scenario. Future systems enabling logistics functions to be conducted in an OMFTS environment will be developed, tested, and demonstrated. These future systems will be from a result of the demonstration of the Tactical Logistics Distribution System (TLoadS), which was used by MCCDC S&A in Mission Area Analysis studies during FY00.

- (U) Training and Education Imperative: Continue to develop and demonstrate technologies to enhance the cognitive and higher-order abilities of Marine Warfighters. Efforts include: Transition of the SUTT to acquisition. Begin development of the Military Operations In Urban Terrain-Instrumentation System. Initiate design of the Closed Loop Artillery Simulator System.

B. (U) PROGRAM CHANGE SUMMARY: See program change total summary for P.E.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

D. (U) RELATED RDT&E:

- (U) PE 0603004A (Weapons and Munitions Advanced Technology)
- (U) PE 0603005A (Combat Vehicle and Automotive Advanced Technology)
- (U) PE 0603606A (Landmine Warfare and Barrier Advanced Technology)
- (U) PE 0603607A (Joint Service Small Arms Programs)
- (U) PE 0603619A (Landmine Warfare and Barrier Advanced Demonstrations)
- (U) PE 0603772A (Battlefield Force Integrations)
- (U) PE 0604710A (Night Vision Systems - Engineering Development)
- (U) PE 0604808A (Landmine Warfare and Barrier Engineering Development)
- (U) PE 0602301E (Computing Systems and Communications Technology)
- (U) PE 0602702E (Tactical Technology) Technology Demonstrations (ATDs)
- (U) PE 0603226E (Experimental Evaluation of Major Innovative Technologies)
- (U) PE 0206623M (Marine Corps Ground/Supporting Arms Systems)
- (U) PE 0602131M (Marine Corps Landing Force Technology)
- (U) PE 0603612M (Marine Corps Mine/Countermeasures Systems)

R-1 Line Item 21

Budget Item Justification
(Exhibit R-2, page 7 of 20)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 3

PROGRAM ELEMENT: 0603640M

PROJECT NUMBER: C2223

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Demonstrations

PROJECT TITLE: Marine Corps
Advanced Technology

(U) PE 0603635M (Marine Corps Ground Combat/Support System)
(U) PE 0204163N (Fleet Communications)
(U) PE 0602315N (Mine Countermeasures, Mining and Special Warfare Technology)
(U) PE 0603555N (Undersea Superiority Technology Demonstrations)
(U) PE 0603782N (Mine and Expeditionary Warfare Advanced Technology)
(U) PE 0603794N (Command, Control, Communications, Advanced Technology)
(U) PE 0206313M (Marine Air Ground Task Force Command/Control/Communications/Computers & Intelligence)
(U) PE This program is in compliance with Tri-Service Reliance Agreements

E. (U) SCHEDULE PROFILE: Not Applicable.

R-1 Line Item 21

Budget Item Justification
(Exhibit R-2, page 8 of 20)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

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BUDGET ACTIVITY: 3

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PROJECT NUMBER & TITLE	FY 1999 ACTUAL	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C2297 Marine Corps Warfighting Laboratory (MCWL)	27,410	47,537	32,727	32,760	33,407	34,465	35,173	CONT.	CONT.

A.(U)MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Marine Corps Warfighting Laboratory (MCWL) is the centerpiece for the operational enhancement of the Marine Corps. Using the Special Purpose Marine Air-Ground Task Force (Experimental) (SPMAGTF(X)) as its "test bed" organization, MCWL demonstrates the usefulness and necessity of integrating new technological developments and advanced concepts into the Operational Forces of the Marine Corps. MCWL focuses on developing and field testing future operational and technological concepts to enhance warfighting capability. The organizational thrust is to provide an institutional mechanism for continuously generating new ideas for warfighting capabilities. Concepts of operation "Sea Dragon" are validated by means of various Warfighting Experiments.

(U) Sea Dragon is a process of experimentation which is designed as an ongoing mechanism to insure the relevance of Marine forces in the face of change. Sea Dragon encompasses inquiries into multiple technology and warfighting areas, including: Command, Control, Communications, Computers, and Intelligence (C4I); fires; medical, biological, chemical, and non-lethal technologies; expeditionary logistics; and advanced training and education techniques.

(U) Using experimental operational forces, beginning with the SPMAGTF(X) as the forward element of a future Naval Expeditionary Force, the MCWL will conduct a number of Advanced Warfighting Experiments (AWEs) supported by several Limited Objective Experiments (LOEs), Limited Technology Assessments (LTAs), Wargames, and Studies.

1) An AWE is defined as a larger scale operational experiment where advanced warfighting capabilities and enabling technologies are evaluated to determine the military utility, operational effectiveness, and operational suitability in as realistic an environment as possible. These AWEs will examine an operational concept that envisions a greatly expanded, lethal, fluid, chaotic, and more opportunistic battlefield within a maneuver warfare approach. All experimentation conducted during a phase builds toward the AWE.

R-1 Line Item 21

Budget Item Justification
(Exhibit R-2, page 9 of 20)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 3

PROGRAM ELEMENT: 0603640M

PROJECT NUMBER: C2297

PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology
Demonstrations

PROJECT TITLE: MCWL

2) LOEs are considerably smaller in scope than AWEs and focus on a discrete set of closely related Experiment objectives. These experimental forces will be highly trained, technologically infused, highly lethal, and intellectually prepared to fight in this chaotic and opportunistic environment. LOEs are designed to answer questions that, if left unanswered, would have a significant adverse impact on the successful execution of experimental operations in the related AWE.

3) LTAs focus on the performance characteristics of specific technologies and assess their usefulness by means of analysis or experimentation. MCWL plans and conducts LTAs to effectively incorporate a technology into follow-on experiments.

4) A Wargame is a broad discipline manifested in a range of activities from a few individuals conducting Action-Reaction-Counteraction drills to a significant commitment from Operating Forces Staff or SPMAGTF(X) Command Element (CE) to execute a Command Post Exercise supported by extensive modeling and simulation. A Wargame is integral to MCWL's experimental process and precedes the execution of each LOE/AWE to refine the LOE/AWE experimentation plan.

5) A Study is a low-cost (relative to operational experimentation) technique designed to result in broader or deeper research into an Experimental Issue. MCWL undertakes a study when a literature search reveals that existing studies are inadequate to support experiment objectives and synthesis is required and is focused on one or a few closely related Experiment Issues. A Study can contribute to any stage of the Innovation and Experimentation Process, but is most useful during experiment planning.

(U) Under the guidance of the extended Five-Year Experimentation Plan, MCWL's current plans include five AWE "build-up" phases culminating in actual AWE execution:

1) Hunter Warrior: (March 1996 through April 1997) Experimented with advanced operational concepts and technologies on an extended and dispersed battlefield, in open and mountainous terrain at the mid-intensity operational level.

2) Urban Warrior: (April 1997 through June 1999) Focused on developing new tactics, techniques, and procedures; and supporting technologies for operations in urban, close terrain, and near urban littoral areas.

3) Capable Warrior: (June 1999 through 2001) Uses lessons learned in Hunter Warrior and Urban Warrior to integrate the full capability of a Marine Air-Ground Task Force (MAGTF) with naval units operating at the numbered fleet level of a Joint Task Force from the sea.

4) Coalition Warrior (FY 2002 through FY 2003) Focuses on the integration of 21st century sea-based technologies into coalition warfare; which begins to examine the challenges of Marine Expeditionary Force (MEF) level Operational Maneuver from the Sea (OMFTS) implementation.

R-1 Line Item 21

Budget Item Justification
(Exhibit R-2, page 10 of 20)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

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BUDGET ACTIVITY: 3

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PROJECT NUMBER: C2297

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5) Joint Warrior (FY 2004) Encompasses designs to lead into United States Atlantic Command's "Olympic Event Experiment". Focuses on executing OMFTS as the maritime portion of Joint Vision (JV) 2010.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:

- (U) MCWL Operations (Support): Expanded Strategic Planning through the location, development, and evaluation of advanced warfighting operational and organizational concepts and related enabling technologies. Synthesized results and lessons learned into proposed tactics, techniques, and procedures (TTPs) for the Marine Corps. Expanded research; planning; model and simulation, concept, and wargame development; preparation; execution; and analysis and assessment to extend exploration of critical components. Began Capable Warrior Experimentation Planning and technology investigations. Continued to provide for MEF (Pacific) Battle Laboratory Scientific Advisor.
- (U) C4I: Expanded systems engineering; integration; and technical, hardware, and software support of the Integrated Marine Multi-Agent Command and Control System (IMMACCS) Engine and communications backbone (infrastructure integration) allowing situational awareness and the Common Operational Picture (COP) at all levels of the MAGTF. Continued systems engineering and integration efforts and provided technical support for the Experimental Combat Operations Center (ECOC). Continued two-dimensional (2D) Viewer development, which provides for rapid decision making in order to facilitate human understanding of operational plans, to support the IMMACCS concept. Continued to expand and enhance the Shared Net and Internet-Node-in-the-Sky (INITS), Unmanned Aerial Vehicle (UAV) transportable communications system, initiatives. Continue the integration of single integrated air/ground picture for mission planning and fire support. Completed Object-Oriented database effort required by the IMMACCS using National Imagery and Mapping Agency data as input. Purchased commercially available hand-held radios and conducted various squad-level communications experiments as well as conducted radio frequency spectrum analysis investigations. Provided funding for Information Operations support to interface with the IMMACCS developers, in the collection, interpretation, formulation, and validation of the elements of the IMMACCS Object Model (IOM), the customization of the content of the IOM for the Urban Warrior AWE, and the identification, description, and explanation of appropriate warfighting scenarios that can be used as a basis for the design of the IMMACCS Agent Engine.
- (U) Drones, Aviation, and Sensors: Continued development of the Broad Area Unmanned Responsive Resupply Operations (helicopter/ UAV capable of carrying heavy loads) by initiating conversion of the commercial manned K-MAX

R-1 Line Item 21

Budget Item Justification
(Exhibit R-2, page 11 of 20)

UNCLASSIFIED

UNCLASSIFIED

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PROJECT NUMBER: C2297

PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology
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PROJECT TITLE: MCWL

helicopter into an unmanned platform, utilizing dynamic response modeling. Continued enhancing the Expendable Drone UAV (Dragon Drone), concentrating on payload development, to perform battle damage assessment; data targeting; reconnaissance and surveillance; and accurate deployment of unattended sensors. Obtained Dragon Drone aviation certification and completed Dragon Drone ship integration efforts which allow the system to be easily removed at the end of the deployment. Continued "Real Time Targeting", "Reachback", and "Network-Centric" experiments. Investigated the capabilities of Unmanned Ground Vehicles equipped with an unattended sensor suite, including video to improve battlefield situational awareness. Provided the SPMAGTF(X) with a complete battlefield sensor capability to improve battlefield situational awareness. Initiated aviation based simulation/instrumentation efforts. Expanded investigations/experimentation in aviation technologies and aviation employment in the urban environment to include initiation of a unique urban aviation range used to conduct close air support experimentation. Searched for new and emerging technologies.

- (U) Fires and Targeting: Continued development of the experimental prototype Dragon Fire (unattended) Mortar System. Continued development of Mobile Counter Fires System (automated fires system), to include advanced optics support. This capability will potentially allow the instant detection of incoming fires and rapid slewing of the weapon to the origin of fires. Continued development of a precision-targeting device that includes a laser range finder, which will provide ground forces with accurate target acquisition. Initiated sensor to weapons links for increased responsiveness to calls for fire. Investigated suppressed combat rifle initiatives. Continued to investigate emerging fires and targeting technologies.
- (U) Sea basing, Logistics, Combat Service Support (CSS), and Combat in Cities (including Training and Education): Continued integrating clothing and equipment that will enhance Marines' survivability in urban combat. Continued to search for, evaluate, and perform sea-basing analysis. Fabricated mounting assemblies, cables, and hardware modifications required to support the "Boom Gun" concept, which involves mounting a remotely controlled gun (Compact Lightweight Armored Weapons System on a 7.5 ton tactical crane and using the boom to raise the gun to a height of 40 to 50 feet. The elevated gun was then used to provide area surveillance and force protection for units operating in the vicinity. Continued to experiment with electronic markers, providing vehicle position/location data, time-stamp data, and remote maintenance data to the Combat Service Support Operations Center (CSSOC) via a long-range satellite based communications link. Continue to provide sea-based logistical support. Evaluated combat service support for emerging and developing weapons as they apply to operational concepts of logistics support and sustainment for various non-standard scenarios. Continued to support Military Operations in Urban Terrain (MOUT) training facility efforts by supplying a training munitions that allows for live fire training in existing and upgraded urban warfare training facilities that does no damage to buildings and is relatively safe to use. Continued development and implementation of components of a prototype Combat Squad Leaders Presentation in support of the MCWL experimentation efforts. Investigated existing and emerging training

R-1 Line Item 21

Budget Item Justification
(Exhibit R-2, page 12 of 20)

UNCLASSIFIED

UNCLASSIFIED

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enhancements and simulation equipment and devices. Continued to search for and evaluate emerging commercially available technologies that could significantly improve efforts in this area.

- (U) Chemical/Biological (Chem/Bio), Medical, Analysis and Non-Lethals: Continued medical investigations by initializing planning stage for the development of high-density electric auxiliary power units to be used with a treatment shelter system designed to provide forward emergent resuscitative surgery and patient holding. Expanded instrumentation capability that supported MCWL experimentation in the urban environment. Continued efforts to improve upon the automated data collection system, which was designed and implemented during Hunter Warrior and used during Urban Warrior. Continued to provide overall systems engineering and integration support for ongoing experimentation. Continued to provide overall analysis and reporting of experimentation efforts. Conducted Hazards of Electromagnetic Radiation to Ordnance testing of the Dragon Drone non-lethal payload. Conducted an engineering investigation to determine the best way to interface the Dragon Drone ground control station to the non-lethal payload station. Seek Non-Lethal technologies, which can affect an opponent's infrastructure without necessarily destroying it. Investigate the use of Non-Lethal technologies to deter, delay, deny, disrupt, and destroy opponents or their material.

2. (U) FY 2000 PLAN:

- (U) MCWL Operations (Support): Continue Strategic Planning through the location, development, and evaluation of advanced warfighting operational and organizational concepts and related enabling technologies. Synthesized results and lessons learned into proposed TTPs for the Marine Corps. Continue research; planning; model and simulation, concept, and wargame development; preparation; execution; and analysis and assessment to extend exploration of critical components. Continue Capable Warrior Experimentation Planning and technology investigations. \$500K- Provide for Marine Forces (Atlantic and Pacific) Battle Laboratories to conduct experimentation to include MEF (Pacific) Battle Laboratory Scientific Advisor.
- (U) 4I: Incorporate lessons learned from the Urban Warrior AWE into ongoing development efforts and the three LOEs scheduled for FY 2000. Initiate experimental planning and C4I Surveillance Reconnaissance (C4ISR) development to support the Capable Warrior AWE. Continue to develop information processing and further integrate capabilities into IMMCCS and the ECOC facility. Continue to develop enhanced capability for INITs, Shared Net, and 2D Viewer efforts. Develop additional capability for the IMMCCS Agent Engine using adaptive algorithms. Develop enhancements for information management systems to provide the Common Tactical Picture at all levels (squad leader to Commander) of the MAGTF. Initiate advanced command and control investigations and experiments for sea based fire

R-1 Line Item 21

Budget Item Justification
(Exhibit R-2, page 13 of 20)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 3

PROGRAM ELEMENT: 0603640M

PROJECT NUMBER: C2297

PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology
Demonstrations

PROJECT TITLE: MCWL

support. Continue to investigate commercially available (off-the-shelf) technology for providing wireless connectivity from Marine squads into IMMACCS.

- (U) Drones, Aviation, and Sensors: Initiate UAV small payload development for the Dragon Warrior (low cost, small tactical vertical takeoff and landing drone); focusing on reconnaissance, surveillance, and target acquisition capabilities. Initiate UGV payload development focusing primarily on reconnaissance, surveillance, and target acquisition capabilities. Initiate development of a "Micro" (miniature) UAV. Develop a class of large population, autonomous, robots capable of collecting and reporting on battlefield intelligence. Initiate development or adaptation of an airborne vehicle platform that can remain aloft indefinitely to facilitate Over the Horizon (OTH) communications to support nearly all aspects of OMFTS. Expand investigations/experimentation in aviation technologies that could lead to increasing accuracy and effectiveness of Close Air Support missions and also reduce the possibility of fratricide. Continue aviation experimentation in the urban environment. Continue aviation based simulation/instrumentation efforts. Continue search for new and emerging technologies.
- (U) Fires and Targeting: Complete development of the experimental prototype Dragon Fire (Unattended) Mortar System. Complete development of Mobile Counter Fires System (automated fires system). Continue development of a precision targeting device that includes a laser range finder that will provide ground forces with accurate target acquisition. Initiate experimentation with/development of small precise munitions. Initiate rapid target system exploration/demonstration/development as a technical means of ensuring that the target selected by the ground observer is in fact the same one the pilot is intending to attack by providing a video image of the target to the pilot, the terminal controller, and the individual tasked with coordinating fires. Develop a Combined Arms Coordination Simulation that would use computerized decision support tools to rapidly de-conflict the paths of friendly airborne objects in the battlespace. This technology investigation has the capability to increase responsiveness of supporting fires while reducing the possibility of fratricide. Continue to investigate emerging fires and targeting technologies.
- (U) Sea basing, Logistics, CSS, and Combat in Cities (including Training and Education): Develop and integrate the combat service support tools/system that will make up the Marine of 2010. Invest in all types of simulation to allow required OMFTS warfighting capabilities to be tested. Continue to search for, evaluate, and perform enhanced sea based logistics support and sea basing analysis. Experiment with the Object Individual Combat Weapon (OICW) and make a determination as to whether it fulfills MCWL capability requirements. Investigate development of a system that tracks personnel involved in a Non-combatant Evacuation Operations, to include personal data (i.e., name, family background, medical and administrative data, etc). Continue rapid prototype development, demonstration, and transition of logistics information resources technologies for deployable expeditionary CSSOC applications. Complete development of the Rapid Request Tracking System. Continue system concept

R-1 Line Item 21

Budget Item Justification
(Exhibit R-2, page 14 of 20)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 3

PROGRAM ELEMENT: 0603640M

PROJECT NUMBER: C2297

PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology
Demonstrations

PROJECT TITLE: MCWL

modeling/simulation support for decision support and technology plan development for Joint Expeditionary Forcers. Investigate and incorporate automated information technologies for asset tracking, interactive, condition based maintenance support, and sensor logistics information feeds. Develop expeditionary bulk liquids technology to support a total distribution concept. Continue integrating clothing and equipment that will enhance Marines' survivability. Continue to experiment with electronic markers. Continue to leverage ongoing work in the Day/Night Small Unit Target Acquisition field. Continue to evaluate combat service support for emerging and developing weapons as they apply to operational concepts of logistics support and sustainment for various non-standard scenarios. Develop and implement components of a prototype Combat Lieutenant's Course in support of MCWL experimentation efforts. Continue to investigate existing and emerging training enhancements and simulation equipment and devices. Continue to search for and evaluate emerging commercially available technologies that could significantly improve efforts in this area

- (U) Chem/Bio, Medical, Analysis, and Non-Lethals: Continue medical investigations and complete the planning stage for the development of high-density electric auxiliary power units to be used with medical treatment shelters. Complete a Human Physical Performance in MOUT study by developing a physiologically based conditioning program to enhance physical performance and prevent injuries for Marine infantry in MOUT. Define the scope; nature; technical utilities; and TTPs that support domestic and international responses to the human and material casualties of a weapon of mass destruction (WMD) deployment. Continue to support instrumentation capability that provides battlespace instrumentation for experimentation. Continue efforts to improve upon the automated data collection system. Continue to provide overall systems engineering and integration support for ongoing experimentation. Continue to provide overall analysis and reporting of experimentation efforts. Continue to seek Non-Lethal technologies that can affect an opponent's infrastructure without necessarily destroying it. Continue to investigate the use of Non-Lethal technologies to deter, delay, deny, disrupt, and destroy opponents or their material.

3. (U) FY 2001 PLAN:

- (U) MCWL Operations (Support): Continue Strategic Planning through the location, development, and evaluation of advanced warfighting operational and organizational concepts and related enabling technologies. Synthesized results and lessons learned into proposed TTPs for the Marine Corps. Continue research; planning; model and simulation, concept, and wargame development; preparation; execution; and analysis and assessment to extend exploration of critical components. Continue Capable Warrior Experimentation Planning and technology investigations. Initiate Coalition Warrior Experimentation Planning and technology investigations. Continue to provide for Marine Forces (Atlantic and Pacific) Battle Laboratories to conduct experimentation, including MEF (Pacific) Battle Laboratory Scientific Advisor.

R-1 Line Item 21

Budget Item Justification
(Exhibit R-2, page 15 of 20)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 3

PROGRAM ELEMENT: 0603640M

PROJECT NUMBER: C2297

PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology
Demonstrations

PROJECT TITLE: MCWL

- (U) C4I: Continue ongoing technical development efforts and conduct LOEs planned for the build up to the Capable Warrior AWE. Continue experimental planning and C4ISR development to support the Capable Warrior AWE. Continue to develop information processing and further integrate capabilities into IMMACCS and the ECOC facility. Integrate developed capability for INITs, Shared Net, and 2D Viewer efforts to support demonstration in Capable Warrior. Integrate and test IMMACCS Agent Engine capability. Evaluate performance of information management systems to provide the Common Tactical Picture at all levels (squad leader to Commander) of the MAGTF. Conduct experiments and evaluates the performance of advanced command and control investigations and experiments for sea based fire support. Evaluate the effectiveness of commercially available (off-the-shelf) technology for providing wireless connectivity from Marine squads into IMMACCS.
- (U) Drones, Aviation, and Sensors: Continue small payload development for Dragon Warrior UAV. Continue UGV payload and UAV micro development efforts. Continue development of a class of large population, autonomous, robots capable of collecting and reporting on battlefield intelligence. Continue development of an airborne vehicle platform to facilitate OTH communications. Continue investigations/experimentation in aviation technologies that could lead to increasing accuracy and effectiveness of Close Air Support missions and also reduce the possibility of fratricide. Continue aviation experimentation in the urban environment and aviation based simulation/instrumentation efforts. Continue to search for new and emerging technologies.
- (U) Fires and Targeting: Complete development of Mobile Counter Fires System (automated fires system). Continued development of a precision targeting device that includes a laser range finder that will provide ground forces with accurate target acquisition. Continue experimentation with / development of small precise munitions. Continue rapid target system exploration/demonstration/development. Continue Combined Arms Coordination Simulation efforts. Continue to investigate emerging fires and targeting technologies.
- (U) Sea basing, Logistics, CSS, and Combat in Cities (including Training and Education): Continue to develop and integrate the combat service support tools/system that will make up the Marine of 2010. Continue to invest in all types of simulation to allow required OMFTS warfighting capabilities to be tested. Continue to search for, evaluate, and perform sea based logistics support and sea basing analysis. Continue to experiment with the OICW. Continue investigation/development of a system that tracks personnel involved in a Non-combatant Evacuation Operations. Continue rapid prototype development, demonstration, and transition of logistics information resources technologies. Continue system concept modeling/simulation support for decision support and technology plan development for Joint Expeditionary Forcers. Continue to investigate and incorporate automated information technologies for asset tracking, interactive, condition based maintenance support, and sensor logistics information

R-1 Line Item 21

Budget Item Justification
(Exhibit R-2, page 16 of 20)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 3

PROGRAM ELEMENT: 0603640M

PROJECT NUMBER: C2297

PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology
Demonstrations

PROJECT TITLE: MCWL

feeds. Continue development of expeditionary bulk liquids technology to support a total distribution concept. Continue integrating clothing and equipment that will enhance Marines' survivability. Continue to experiment with electronic markers. Continue to leverage ongoing work in the Day/Night Small Unit Target Acquisition field. Continue to evaluate combat service support for emerging and developing weapons as they apply to operational concepts of logistics support and sustainment for various non-standard scenarios. Continue to investigate existing and emerging training enhancements and simulation equipment and devices. Continue to search for and evaluated emerging commercially available technologies that could significantly improve efforts in this area.

- (U) Chem/Bio, Medical, Analysis, and Non-Lethals: Continue medical investigations, including investigations into the chemical/biological arena. Continue to define the scope; nature; technical utilities; and TTPs that support domestic and international responses to the human and material casualties of a weapon of mass destruction WMD deployment. Continue to support instrumentation capability that provides battlespace instrumentation for experimentation. Continue efforts to improve upon the automated data collection system. Continued to provide overall systems engineering and integration support for ongoing experimentation. Continued to provide overall analysis and reporting of experimentation efforts. Continue to seek Non-Lethal technologies that can affect an opponent's infrastructure without necessarily destroying it. Continue to investigate the use of Non-Lethal technologies to deter, delay, deny, disrupt, and destroy opponents or their material.

B. (U) PROGRAM CHANGE SUMMARY: See program change total summary for P.E.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

D. (U) RELATED RDT&E:

(U) PE 0603640M (Marine Corps Advanced Technology Demonstrations), Project C2223, Advanced Technology Demonstrations

(U) PE 0603640M (Marine Corps Advanced Technology Demonstrations), Project C2362, Extended Littoral Battlespace,

Advanced Concept Technology Demonstration

(U) PE 0305204 (Marine Corps Tactical UAV), Project C2672, Marine Corps close Range Tactical UAV (Dragon Warrior)

E. (U) SCHEDULE PROFILE: Not applicable.

R-1 Line Item 21

Budget Item Justification
(Exhibit R-2, page 17 of 20)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 3

PROGRAM ELEMENT: 0603640M

PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations

(U) COST: (Dollars in thousands)

PROJECT

NUMBER & TITLE	FY 1999 ACTUAL	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
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R2362 Extended Littoral Battlespace (ELB) Advanced Concept Technology Demonstration (ACTD)	9,898	9,598	9,523	946	943	0	0	0	45,503
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A.U)MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Concept of Operations for the Extending the Littoral Battlespace (ELB) Advanced Concept Technology Demonstration (ACTD) responds to the top level military need to rapidly deploy a Naval Expeditionary Task Force with an embarked Marine Air Ground Task Force (MAGTF) as part of a larger Joint Task Force to any region of the world's littorals and conduct military operations from a sea base across the spectrum of conflict to implement national military strategy. Forces employed ashore will be light, agile, distributed and disaggregated and capable of optimizing remote fires, to effectively deter aggression, halt attacks and secure critical areas as a precursor to a much larger force. Forces will be empowered by unprecedented situation understanding via a robust information infrastructure that is fully coupled to a decision/planning/execution system on a shared battlespace network (sea/land). The objective of the ACTD is to demonstrate an enhanced integrated command and control/fires and targeting capability to enable rapid employment, maneuver, and fires to support joint dispersed units operating in an extended littoral battlespace. Two Major System Demonstrations (MSDs) are planned for FY 1999 and FY 2001. The ELB ACTD was approved by DUSD(AT) on 16 January 1997.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:

- (U) Continued pre-demonstration activities to include system installation, integration, test, software verification and validation, ship installation, operator training, system scenario tests and dry runs. Completed the integration of selected enabling technologies into the Command, Control, Communication, Computers and Intelligence, Surveillance, Reconnaissance (C4ISR) system. The C4ISR system was deployed on ELB testbeds and integrated with other distributed command center nodes, integrated feasibility demonstrations were performed, and demonstration training did commence along with final preparations for MSD I.

R-1 Line Item 21

Budget Item Justification
(Exhibit R-2, page 18 of 20)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 3

PROGRAM ELEMENT: 0603640M

PROJECT NUMBER:C2297

PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology
Demonstrations

PROJECT TITLE: ELB ACTD

- (U) Conducted a demonstration of C4ISR system architecture in a realistic combat scenario utilizing operational forces from the Fleet and the Fleet Marine Force. Demonstration did provide the means for operators and developers to evaluate the operational utility, technological feasibility, and life cycle implications of new technologies.
- (U) Initiated demonstration/post demonstration analysis for evaluating the system concept and assessing its military utility.
- (U) Initiated planning for MSD II.
- (U) Initiated planning for transition sets of MSD I technology to appropriate users for military utility assessment.

2. (U) FY 2000 PLAN:

- (U) Continue planning and augment/scope the C4ISR system design for MSD II in FY 2001 based on results of MSD I in sufficient time to develop necessary interface/integration of hardware and software, verification and validation, and assessment criteria.
- (U) Conduct enabling technology efforts to incorporate and integrate newly emerging commercial state-of-the-shelf technologies in areas of communications, combat operations center, sensor integration, and fires and targeting into the second demonstration. Provide full database and object interoperability between emerging and legacy systems.
- (U) Initiate selection, purchase, and installation of "next generation" mature commercial off-the-shelf system and subsystem components for the FY 2001 demonstration.
- (U) Plan and conduct integrated feasibility demonstrations to provide an operational assessment and to collect data relative to technologies/systems for purposes of defining technical risks and refinement of hardware/software design configurations.
- (U) Conduct engineering, technical and operational assessments to define system demonstration scenarios.
- (U) Complete the demonstration/post demonstration analysis. Determine, provide, and support transition sets of

R-1 Line Item 21

Budget Item Justification
(Exhibit R-2, page 19 of 20)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 3

PROGRAM ELEMENT: 0603640M

PROJECT NUMBER:C2297

PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology
Demonstrations

PROJECT TITLE: ELB ACTD

MSD I technology to appropriate users for further military utility assessment.

3. (U) FY 2001 PLAN:

- (U) Continue pre-demonstration activities to include system purchase installation, interface/integration, test, software verification and validation, ship installation, and operator training based on IFD results and completed design. Complete the selection and integration of selected enabling technologies into the C4ISR system. Incorporate improved system features from areas such as sensor fusion, improved network security and precision-guided indirect fire weapons either in IFDs or through simulation.
- (U) Conduct a demonstration of C4ISR system-of-systems in a realistic combat scenario utilizing operational forces from the Fleet and the Fleet Marine Force. Demonstration will provide the means for operators and developers to evaluate the operational utility, technological feasibility, and life cycle implications of new technologies.
- (U) Initiate demonstration/post demonstration assessment for evaluating the system concept and assessing its military utility and obtain milestone acquisition decision.
- (U) Select, provide, and support transition sets from MSD II to user for further military utility and operator assessment.

B. (U) PROGRAM CHANGE SUMMARY: See program change total summary for P.E.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

D. (U) RELATED RDT&E:

- (U) PE 0603238N (Precision Strike and Air Defense Advanced Technology)
- (U) PE 0602315N (Mine Countermeasures, Mining and Special Warfare Technology)
- (U) PE 0603782N (Mine and Expeditionary Warfare Advanced Technology)
- (U) PE 0603750D (Advanced Concept Technology Demonstrations)
- (U) PE 0603217N (Air Systems and Weapons Advanced Technology)

E. (U) SCHEDULE PROFILE: Not applicable.

R-1 Line Item 21

Budget Item Justification
(Exhibit R-2, page 20 of 20)

UNCLASSIFIED